ARCHAEOLOGICAL
SERVICES
WYAS

Yorkshire Derwent Aqueduct
Duplication Main
Eivington to Riccall
North Yorkshire

Geophysical Survey

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CLIENT
Northern Archaeological Associates

Yorkshire Derwent Aqueduct Duplication Main, Elvington to Riccall, North Yorkshire. (+ City of York)

Geophysical Survey

Contents

Summary

Detailed gradiometer survey covering approximately 12 hectares was carried out at fourteen sites along the route of a proposed water pipeline. Magnetic anomalies thought to be probably archaeological in origin have been identified on two of these sites including the site of a possible Roman villa. Anomalies which may be archaeological in origin are identified at five other sites although correlation with identified cropmarks has been variable. It is thought that this reflects the low magnetic susceptibility of the prevailing soils combined with the depth at which some of the archaeology may be buried.

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1 Introduction

1 1 Archaeological Services WYAS was commissioned by Mr Peter Cardwell of Northern Archaeological Associates to carry out geophysical (fluxgate gradiometer) surveys at selected locations along the route of the Yorkshire Derwent Aqueduct Duplication Main This new water pipeline is broadly parallel with the existing pipehne which runs from the pumping station at Riccall, in the south-west, to Elvington in the north-east (see Fig 1)

1 2 Detailed magnetic survey was undertaken at fourteen sites (Areas A to O, there was no Area I), covering an area of approximately 12 hectares All but three of the sites were selected for survey due to the presence of cropmarks either in (or crossing) the pipe corridor or immediately adjacent to the corridor (see Figs 2, 3, 4 and 5) The exceptions to this were the three most northerly sites situated around the village of Wheldrake More detailed archaeological background on each site is given in Section 3

1 3 The survey was carried out between March 20th and March 28th 2002 The ground cover was mostly short growing arable crop although three sites were deep ploughed and one was laid to permanent pasture No problems were encountered during the survey although the quality of the data was adversely affected in the deep ploughed areas

1 4 Soils from four different soil associations are present along the pipe corridor At the southern end of the corridor Blocks A, B, C and D are located on deep, permeable, sandy and coarse loamy soils of the Blackwood soil association, which are derived from glaciofluvial drift North of King Rudding Lane the soils change and Blocks E, F, K, L, N and O are located on stoneless, clayey and fine loams over clayey soils of the Foggathorpe 2 soil association, which are derived from glaciolacustrine clays Deep, stoneless, fine sandy soils of the Everingham soil association, derived from Aeolian sands, are present in Blocks G, H and J whilst Block M is located on soils of the Bishampton soil association which are characterised by deep, fine loamy soils derived from till and glaciofluvial drift The type and composition of the soils is likely to have an impact on the results of the geophysical survey

2 Methodology and Presentation

2 1 The objectives of the survey were to establish the presence, extent and character of any archaeological magnetic anomalies m each of the survey blocks

2 2 The survey and report use the recommendations outlined in the English Heritage Guidelines (David 1995) as a minimum standard All figures reproduced from Ordnance Survey mapping are done so with the permission of the controller of Her Majesty's Stationery Office © Crown copyright

2 3 A site location plan showing the relative positions of each site is presented, at a scale of 1 100000, in Figure 1 More detailed locational plots are presented as Figures 2, 3, 4 and 5 Greyscale plots and accompanying interpretations are shown in Figures 6 to 27 inclusive at a scale of 1 1000 Large scale, 1 500, greyscale and X-Y trace plots of the data are shown in Figures 28 to 42 inclusive

2 4 Technical information on the equipment used, data processing and magnetic survey methodology are given in Appendix 1 Appendix 2 details the survey locational information and Appendix 3 describes the composition and location of the archive

The interpretative figures should not be looked at in isolation but in conjunction with the relevant discussion section and with the information contained in the Appendices

3 Results and Discussion

3 1 Common across all the survey blocks are 'iron spike' responses (see Appendix 1) that are indicative of ferrous material in the topsoil or subsoil These responses can be caused by archaeological artefacts but are more often caused by modem material Unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance Only the larger responses have been indicated on the interpretation figures

3 2 Also apparent along the edges of some of the blocks are areas of magnetic disturbance manifest by rapid changes from positive to negative readings These anomalous responses have not been shown on the interpretation figures but are caused by the proximity of the survey areas to the existing water pipe

3 3 Block A (SE 6277 3727 centred – Figs 2, 6, 7 and 28)

3 3 1 A complex series of cropmarks has been identified whose focus seems to be immediately west of the survey area but which extends into and beyond the survey area to the west and east

3 3 2 A very weak series of linear anomalies, possibly indicative of archaeological ditches, can be discerned, predominantly in the southern half of this block The basic orientation of most of these anomalies corresponds with identified cropmarks

3 3 3 Clusters of 'iron spike' responses and discrete areas of magnetic enhancement have also been noted in the northern half of the block While not obviously associated with any identified linear anomalies the very close proximity to linear anomalies and other identified cropmarks may suggest archaeological potential although modem or geological causes should not be discounted

3 4 Blocks B and C (SE 6287 3743 centred – Figs 2, 8, 9, 29 and 30)

3 4 1 Isolated cropmarks have also been identified in these two blocks

3 4 2 In contrast to Block A more linear anomalies have been identified than were located as cropmarks However, the apparent regularity of orientation and separation suggests that the majority of these anomalies have an agricultural origin (field drains) Nevertheless, the level of archaeological activity in, and proximity to, Block D (see below) suggests that some of these anomalies may have an archaeological origin

3 5 Block D (SE 6298 3742 centred – Figs 2, 8, 9, 31 and 32)

3 5 1 Roman building material has been ploughed to the surface in the field immediately south of King Rudding Lane in the same area as another complex

of cropmarks has been identified from aerial photographs It has therefore been postulated that Area D may encompass the location of a Roman villa

3 5 2 Although very weak in response a complex of short, interconnecting linear magnetic anomalies has been identified here It is thought that the very small areas enclosed by these anomalies suggests that they delineate the remains of stmctures rather than ditched stock enclosures Information given by the farmer indicates that any remains are probably at least Im below current ground level There is a broad correlation between the observed cropmarks and the identified magnetic anomalies However, the magnetic survey suggests that the area of archaeological activity is larger than is suggested from the cropmark information

3 6 Area E **(SE 6298 3758** centred – **Figs 2, 8, 9** and **33)**

3 6 1 A cropmark complex immediately east of the pipe corridor and other disparate cropmarks further to the east and to the north-west informed the location of this survey block

3 6 2 Various short linear anomalies, predominantly on a west to east aligmnent, have been identified Some are on the same basic west-east alignment as identified cropmarks and may have an archaeological origin Others are thought likely to be caused by field drains or recent agricultural practice An area of magnetic disturbance of unknown origin is also noted Whilst a modem origin is thought probable given the proximity of settlement activity an archaeological explanation cannot be discounted for any of these anomalies

3 7 **Block F (SE 6351 3832** centred – **Figs 2, 10, 11** and **34)**

3 7 1 No cropmarks have been identified in the vicinity of this block

3 7 2 A series of linear anomalies on two differing alignments has been identified in this block These anomalies have been mterpreted as being caused by field drains

3 8 **Block G (SE 6426 3923** centred – **Figs 3, 12, 13** and **35)**

3 8 1 Cropmarks 150m to the north-west and 100m to the east of the block have been identified mnning towards the survey area

3 8 2 Three broadly parallel, very weak, linear anomalies have been identified It is thought that these anomalies are probably agricultural in origin Two short, parallel, linear anomalies aligned from north-west to south-east are also noted Whilst these may be archaeological ditches without any supporting information it is not possible to give a definitive interpretation, although they could be caused by parallel features which show as cropmarks 100m to the east

3 9 **Block H (SE 6517 4057** centred – **Figs 3, 14, 15** and **36)**

3 9 1 Parallel cropmarks can be seen immediately east and west of this block Other cropmarks are also visible to the north-west and south-west

3 9 2 Two short, parallel linear anomalies are identified here These are broadly on the same alignment as cropmarks to the east and west of the survey block and may be archaeological in origin The magnetic background adjacent to these two anomalies is also slightly enhanced, in contrast to the across the rest of the

block where it is extremely flat This could be indicative of archaeological activity in this area

3 10 Block J (SE 6558 4123 centred – **Figs 3, 16, 17** and **37)**

3 10 1 Part of a cropmark, which may form the north-western corner of an enclosure, has been identified in this block However, it is thought that part of this cropmark is caused by an existing trackway which is clearly identified as a linear, dipolar anomaly in the data A single small area of magnetic enhancement is also highlighted Without supporting information it is assumed that this anomaly is likely to have a modern or geological origin

3 11 Block K (SE 6597 4186 centred – **Figs 4, 18, 19** and **38)**

3 11 1 A single linear cropmark, aligned from south-east to north-west, has been identified crossing this block No corresponding magnetic anomaly has been located although it should be noted that this field was deep ploughed at the time of survey and extremely difficult to survey A weak magnetic response could therefore be undetectable against a perturbed magnetic background

3 12 Block L **(SE 6624 4243** centred – **Figs 4, 20, 21** and **39)**

3 12 1 Linear cropmarks forming part of a small enclosure have been identified in this block The presence of an archaeological ditch causing this cropmark has been confirmed by the identification of a corresponding linear magnetic anomaly Additionally two small areas of enhancement adjacent to this enclosure are also noted Given the proximity to the enclosure an archaeological origin is thought possible Other parallel linear anomalies are likely to be agricultural in origin A probable recently infilled field boundary is noted in the south-western corner of the block

3 13 Block M (SE 6715 4475 centred – **Figs 5, 22, 23** and **40)**

3 13 1 Magnetic anomalies resulting from ridge and furrow ploughing are the only anomalies noted in this survey area

3 14 Block N **(SE 6746 4505** centred – **Figs 5, 24, 25** and **41)**

3 14 1 Linear anomalies attributable to ridge and furrow ploughing are again present at the western end of this survey block An area of magnetic disturbance across the middle of the block suggests infilling around a former field boundary Several small areas of magnetic enhancement are also identified Whilst an archaeological origin cannot be discounted, without supporting information, a modern or geological cause is considered probable

3 15 Block O **(SE 6805 4589** centred – **Figs 5, 26, 27** and **42)**

3 15 1 Possible traces of ridge and furrow ploughing have been noted in this field No other anomalies have been identified

4 Conclusions

4 1 Overall there is a variable correlation between the cropmark evidence and the presence of magnetic anomalies Generally more cropmarks have been identified than are detected by the gradiometer survey, although in the areas of densest cropmarks the magnetic survey has suggested the presence of additional features not identified as cropmarks

4 2 It is thought that the paucity of magnetic anomalies that have been detected, relative to the number of cropmarks, is due to the low magnetic susceptibility of the topsoil (particularly the wind blown sands at the southem end of the pipe corridor) and the depth (in excess of Im in places) at which it is likely some of the archaeological features may be present The cropmark features are therefore only generally detected in, or close to, areas of occupation, where there is likely to be occupational debris with a high magnetic susceptibility in the fills of the features Magnetometry has been less successful in identifying individual ditch type features away from centres of occupational activity where the fills of features are more likely to be comprised of soils with a low magnetic susceptibility For these reasons it is suggested that where the presence of cropmarks has not been corroborated by the geophysical data the cropmark evidence may be a more reliable indicator of the below ground survival of archaeological features Nevertheless, the surveys have demonstrated that magnetic survey can, in the right circumstances, locate archaeological features on soils generally considered to be imfavourable for this type of survey

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains

Bibliography

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Acknowledgements

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Figures

Appendices